Earth, our constantly changing home

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TOP: This picture of Earth is sometimes called the blue marble, NASA. SECOND: The tilt of Earth causes seasons, NASA. THIRD: Earth's core. BOTTOM: An image of the moon in orbit around Earth, captured by the Galileo spacecraft in 1992, NASA.

Earth is the third planet from the sun and the fifth largest in the solar system. It is the biggest of the terrestrial planets — those Earth-like worlds made up primarily of rock or metal — though it is only slightly larger than nearby Venus. Our home planet is the only planet in our solar system known to harbor living things. The name Earth is at least 1,000 years old. While the other planets were named after Greek and Roman gods and goddesses, Earth is an Old English word, which simply means "the ground."

Size And Distance

With a radius of 3,959 miles, Earth is the biggest of the terrestrial planets and the fifth largest planet overall.

The Earth is located about 93 million miles from the sun, and light from the sun takes about eight minutes to reach our planet.

Orbit And Rotation

As Earth orbits the sun, it completes one rotation every 23.9 hours. It takes 365.25 days to complete one trip around the sun. The extra quarter of a day presents a challenge to our calendar system, which counts one year as 365 days. To keep our yearly calendars consistent with our orbit around the sun, every four years we add one day. The extra day is called a leap day, and the year to which it is added is called a leap year.

Earth's axis of rotation is tilted 23.4 degrees with respect to the plane of Earth's orbit around the sun. This tilt causes our yearly cycle of seasons. During part of the year, the Northern Hemisphere is tilted toward the sun and the Southern Hemisphere is tilted away. Solar heating is greater in the north, producing summer there, while less direct solar heating produces winter in the south. Six months later, the situation is reversed. When spring and fall begin, both hemispheres receive roughly equal amounts of heat from the sun.

Formation

Earth formed about 4.5 billion years ago, when gravity pulled swirling gas and dust into a compact ball. Like its fellow terrestrial planets, Earth has a central core, a rocky mantle and a solid crust.

Structure

Earth is composed of four main layers, starting with an inner core at the planet's center. The core is enveloped by the outer core, mantle and crust.

The inner core is a solid sphere made of iron and nickel. It is about 759 miles in radius, and its temperature reaches as high as 9,800 degrees Fahrenheit. Surrounding the inner core is the outer core, which is about 1,400 miles thick and is made of iron and nickel fluids.

In between the outer core and crust is the mantle, the thickest layer. This hot, semi-liquid mixture of molten rock is about 1,800 miles thick and has the gooey consistency of caramel. The outermost layer, Earth's crust, goes about 19 miles deep on average on land. At the bottom of the ocean, the crust is thinner, on average about 3 miles deep.

Surface

Like Mars and Venus, Earth has volcanoes, mountains and valleys. Earth's crust and upper mantle are divided into huge plates that are constantly moving. Earthquakes result when plates grind past one another, ride up over one another, collide to make mountains, or split and separate.

Nearly 70 percent of the Earth's surface is taken up by ocean, with an average depth of about 2.5 miles. Almost all of Earth's volcanoes are hidden under these oceans. Hawaii's Mauna Kea volcano is taller from base to summit than Mount Everest, but most of it is underwater. Earth's longest mountain range is also underwater, at the bottom of the Arctic and Atlantic oceans. It is four times longer than the Andes, Rockies and Himalayas combined.

Atmosphere

Near the surface, Earth has an atmosphere that consists of 78 percent nitrogen, 21 percent oxygen and 1 percent other gases such as argon, carbon dioxide and neon. The atmosphere shields us from much of the harmful radiation coming from the sun. It also protects us from meteors, most of which burn up in the atmosphere.

Potential for Life

Earth is unique in that most of our planet is covered in water, since the temperature allows liquid water to exist for extended periods of time. Earth's vast oceans provided a convenient place for life to begin about 3.8 billion years ago.

Some of the features of our planet that make it great for sustaining life are changing due to the ongoing effects of climate change.

Moons

Earth is the only planet that has a single moon. Our moon is the brightest and most familiar object in the night sky, and in many ways it is responsible for making Earth such a great home. It stabilizes our planet's wobble, which has made the climate less changeable over thousands of years.

Some moons are bits of rock that were captured by a planet's gravity, but our moon is likely the result of a collision billions of years ago. When Earth was a young planet, a large chunk of rock smashed into it, displacing a portion of Earth's interior. The resulting chunks clumped together and formed our moon. On average, the moon is located 238,855 miles away from Earth.

Rings

Earth has no rings.

Magnetosphere

Our planet's rapid rotation and molten nickel-iron core give rise to a magnetic field. It is this magnetic field that causes compass needles to point to the North Pole regardless of which way you turn.

Pop Culture

Storytellers have explored the nature of our planet in many books, movies and television shows. The iconic "Planet of the Apes" film (and many sequels) takes place in a future in which astronauts "discover" a planet inhabited by highly intelligent apes and primitive humans, only to realize later that — spoiler alert! — it was Earth all along.

In the long-running and re-booted television series "Battlestar Galactica," tired survivors of a war with highly evolved robots called Cylons are on a quest to find Earth, a long-lost colony.

In other stories, Earth has been abandoned or destroyed, such as in the Joss Whedon series "Firefly" or the book and its film adaptation "The Hitchhiker's Guide to the Galaxy."

Quiz

1 According to the article, Earth's unique qualities have been the cause of much interest. Which section BEST supports the idea outlined above?

(A) Introduction [paragraph 1]

(B) "Atmosphere"

(C) "Moons"

(D) "Pop Culture"

2 Read the sentence from the article.

> *Our home planet is the only planet in our solar system known to harbor living things.*

Which selection from the article BEST explains which of Earth's features is the reason for this?

(A) With a radius of 3,959 miles, Earth is the biggest of the terrestrial planets and the fifth largest planet overall.

(B) As Earth orbits the sun, it completes one rotation every 23.9 hours. It takes 365.25 days to complete one trip around the sun.

(C) Earth's axis of rotation is tilted 23.4 degrees with respect to the plane of Earth's orbit around the sun. This tilt causes our yearly cycle of seasons.

(D) Nearly 70 percent of the Earth's surface is taken up by ocean, with an average depth of about 2.5 miles.

3 In what way has Earth formed its variety of surface features?

(A) The movement of the plates in Earth's outer layers has caused different landscapes to form.

(B) The gases in the atmosphere have been responsible for most of Earth's different landscapes.

(C) The appearance of new landscapes and surface features have risen from openings deep within Earth.

(D) The movement of the oceans has created a variety of volcanoes that have led to other surface features.

4 Which of the following options BEST summarizes how Earth's orbit and rotation affect the seasons?

(A) The axis of the Earth becomes titled depending on the location of the two hemispheres, which causes the Earth to orbit at a closer or greater distance from the sun.

(B) The orbit of the Earth changes speed according to the axis of rotation, causing some areas of the world to have extended warm periods we call summer.

(C) The axis of rotation is tilted within Earth's orbit, and causes the hemisphere tilted toward the sun to experience summer while the other experiences winter.

(D) The orbit of the sun takes less than one complete day and the rotation of the Earth takes one full year, causing the hemispheres to experience opposite seasons.